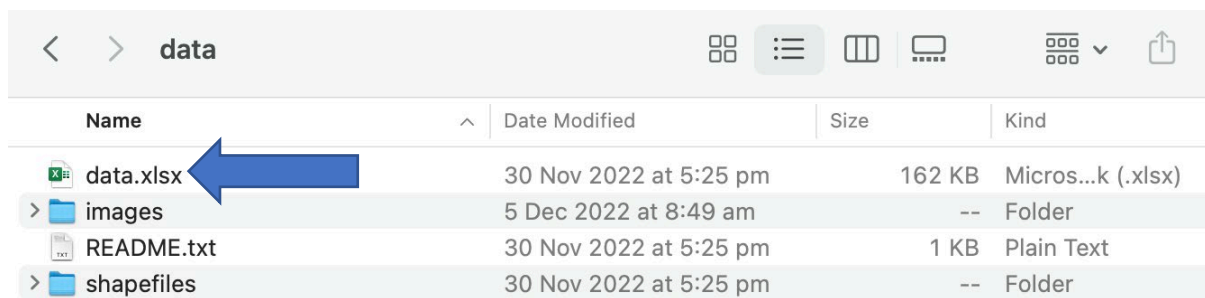


CORALWATCH

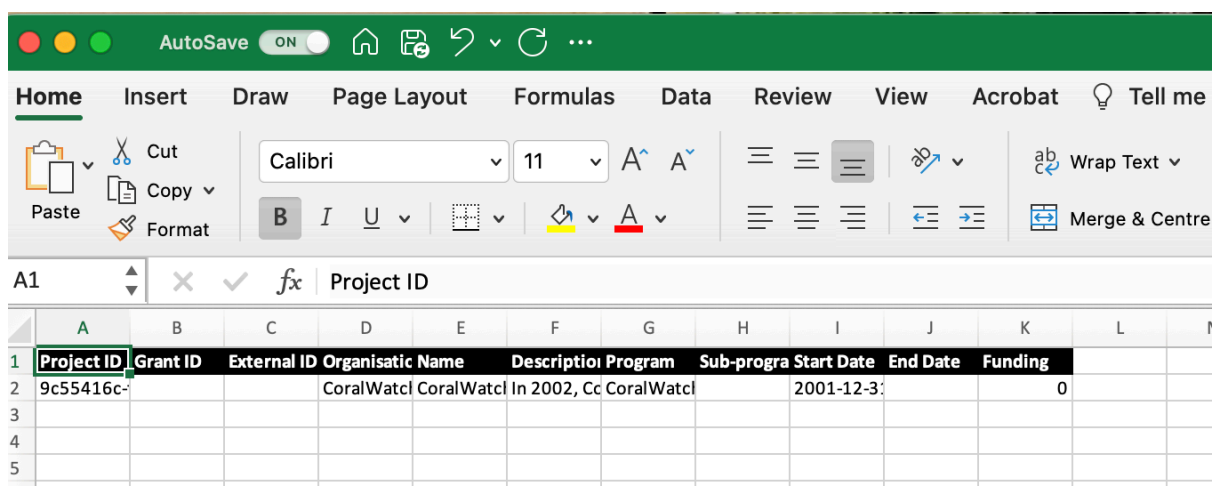
Instructions for CoralWatch database | Creating Bar Graphs for Coral Health Score over time

To access this data, go to the CoralWatch Website and click on the [Data Tab](#). There are instructions for how to use the database [here](#), and you can download guidelines on how to use filters to find the data you want [here](#).

When you download CoralWatch Data from the Atlas of Living Australia (ALA) it will download a zip folder. Click on the ZIP to expand it and open the folder within. Here there will be an excel file, this is your data.



When you open the excel file it will look something like this:



1. Go to the "CoralWatch Random Survey Tab". This is where the data is. The other tabs are supplementary information from the database.



You will now see something like this:

Project ID	Project Act	Activity ID	Start date	End date	Description	Status	Attributor	Latitude	Longitude	Site Name	Site Extern	Not applic	Group nam	Participati	Submitted	Observatio	Time	Light condit	Depth [me	Depth [fe	Not availab	Water tem	Water tem	Not availab	Activity	Comments	Photo of th	Country	location	I used a
9c55416c-6355f9da-169836a1-2001-12-3			2001-12-3		Select coral active	active	CoralWatch	-27.1626	153.3682	Tangaloom			CoralWatch Conservati	Monique G	2016-10-11 11:45 AM	Broken cto	5.0	5.84	70.0	68.0		68.0		Snorkeling	high coral c		Australia	d55ab858-true		

This is the dataset we will be analysing.

For this example, we will be analysing information from: **Heron Island, Blue Pools, Great Barrier Reef (QLD), Australia**

There is a lot of information here, but I've highlighted a few key columns we want to focus on in green. Most of the other information relates to the database setup.

Project ID	Project Act	Activity ID	Start date	End date	Description	Status	Attributor	Latitude	Longitude	Centroid Li	Centroid Li	Site Name	Site Extern	Not applic	Group nam	Participati	Submitted	Observation	Time
9c55416c-6355f9da-8548ceed-2001-12-3			2001-12-3		Select coral active	active	CoralWatch	-23.5634	151.6697			Heron Isla			CoralWatch Conservati	Jenny	8-May-21	08:15 AM	

Light condit	Depth (met	Depth (feet	Not availab	Water tem	Water tem	Not availab	Activity	Comments	Photo of th	Country	location	I used a	GP Coral No.	Colour Code	Colour Code	Average.	Coral Type	Species	Photo
VM	Full sunshir	1.5	4.92	25	77		Snorkeling	Amazing di		Australia	cbc2d693-2 true	1	B2	B4		3	Boulder co		

Activity ID: This is the unique ID given to each CoralWatch Survey.

Site name: The location of the survey.

Observation date: The date the survey took place.

Water temperature: The water temperature when the survey took place.

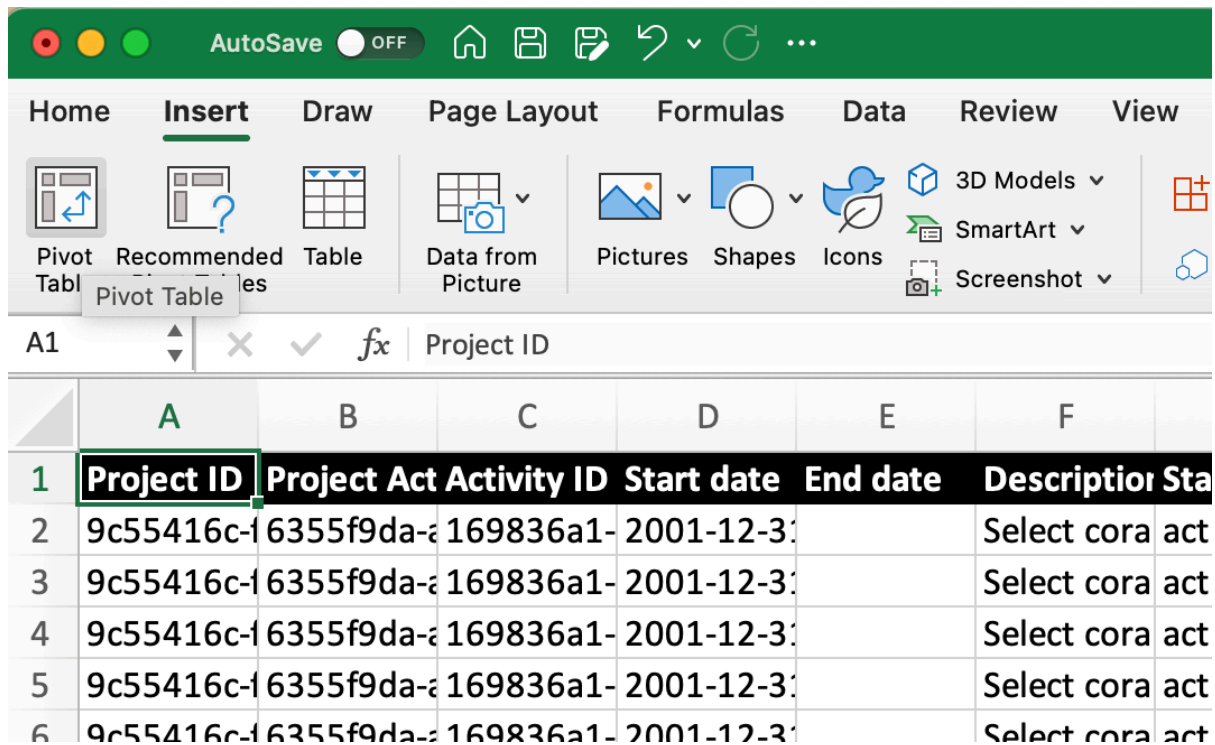
Average: The average colour score for that individual coral surveyed on a scale of 1-6, six being the darkest and healthiest, and 1 being the lightest and

Coral type: The type of coral surveyed, either boulder, branching, plate or soft.

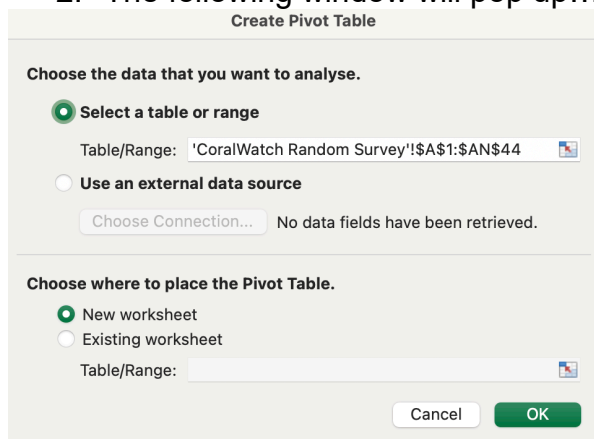
Note: Each row of data is for one individual coral

For this method we will be using Pivot tables.

1. Click back to cell 1 A and go **Insert > Pivot table**



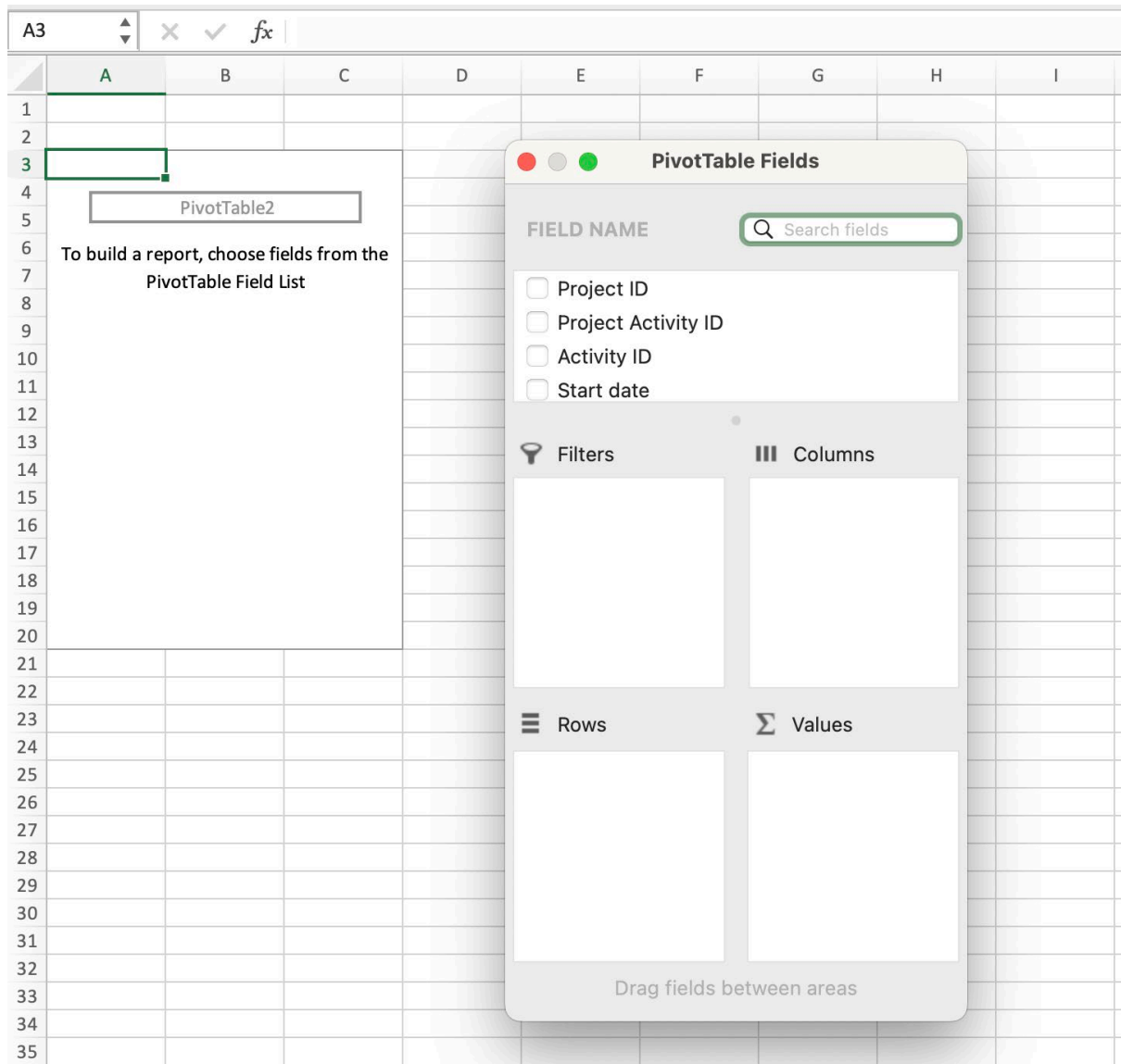
2. The following window will pop up... Click OK



This will appear in a new sheet down the bottom. I like to call mine "Pivot Table" or "Data Analysis"

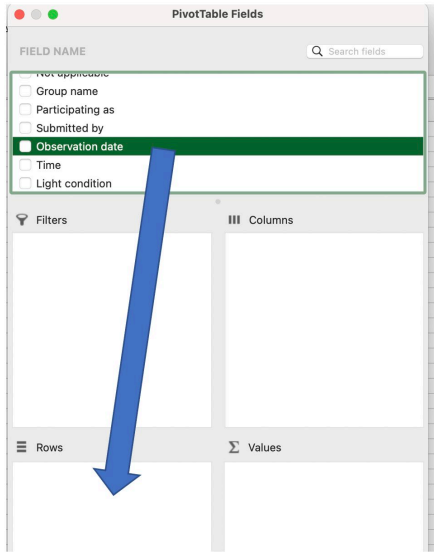


3. You will be presented with a new sheet that looks like this

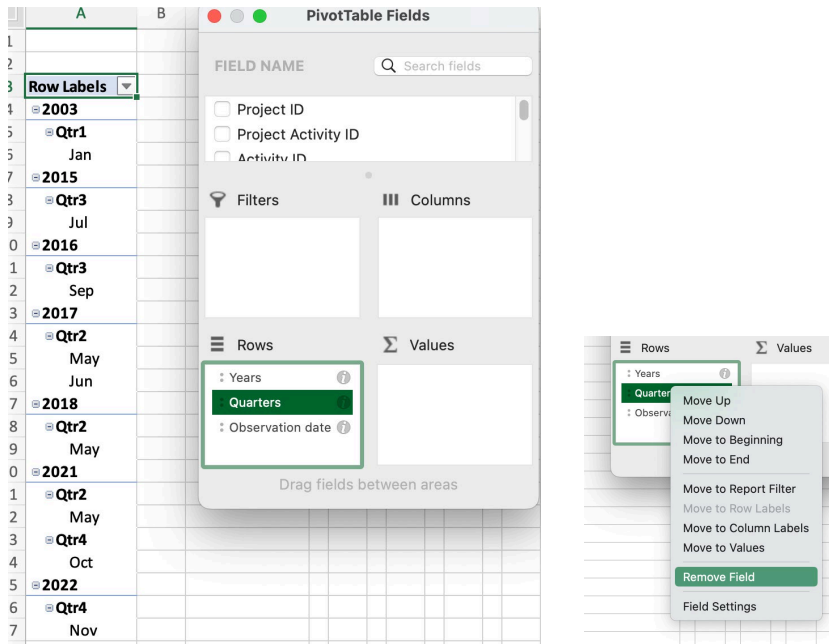


The pivot table fields section is what we will be using. You can drag and drop various categories into each interactive section (Rows, Columns, Values etc) and it will automatically generate a table based on this information)

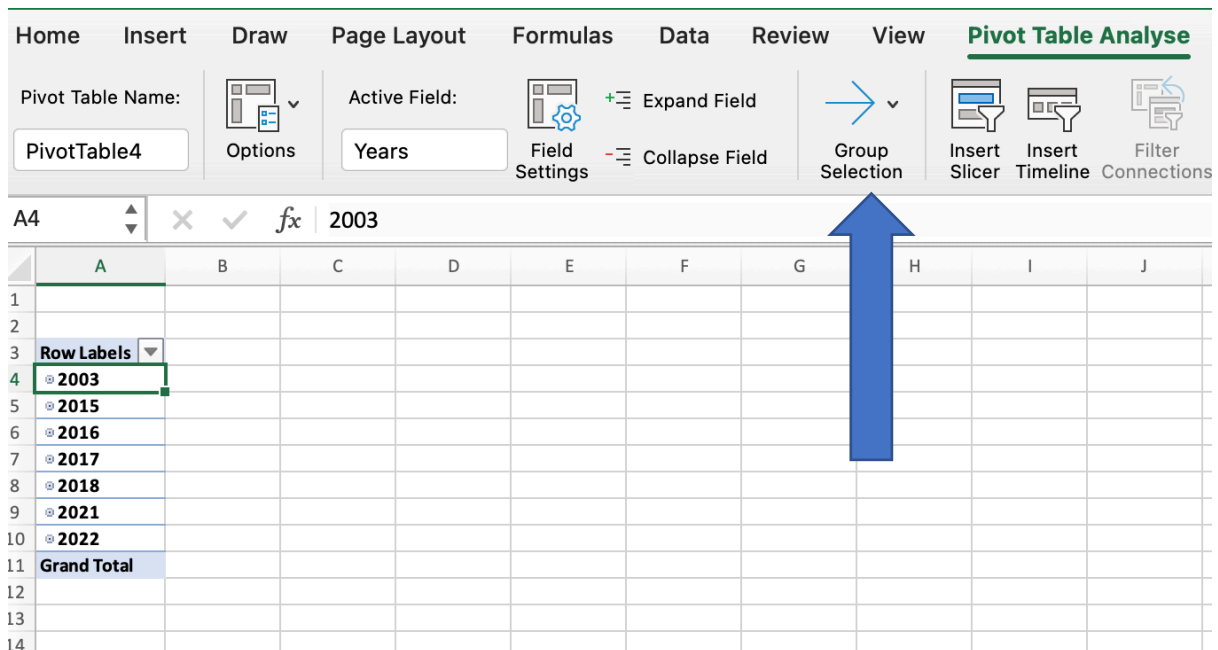
4. Drag observation date into the “Rows section”



5. We now want to group our dates based on years and months. To do this, go to the Pivot Table Field Window and right click on the Row Quarters. Press “Remove Field” to remove the quarters.

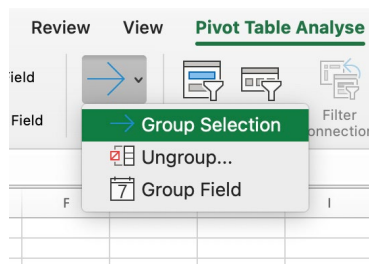


Optional: If you want to analyse your data based on other periods of time, click on the first year of data, in this case A4, and go to **Pivot Table Analyse > Group Selection**

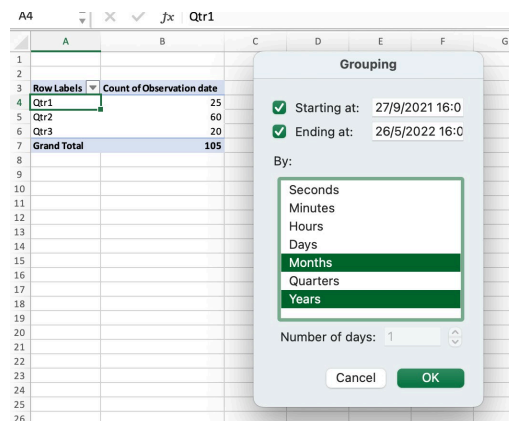


Tip: Make sure you are not clicking with the heading, but rather on the first row of data. If you are in the heading the group selection tool will be “Greyed out” and unavailable.

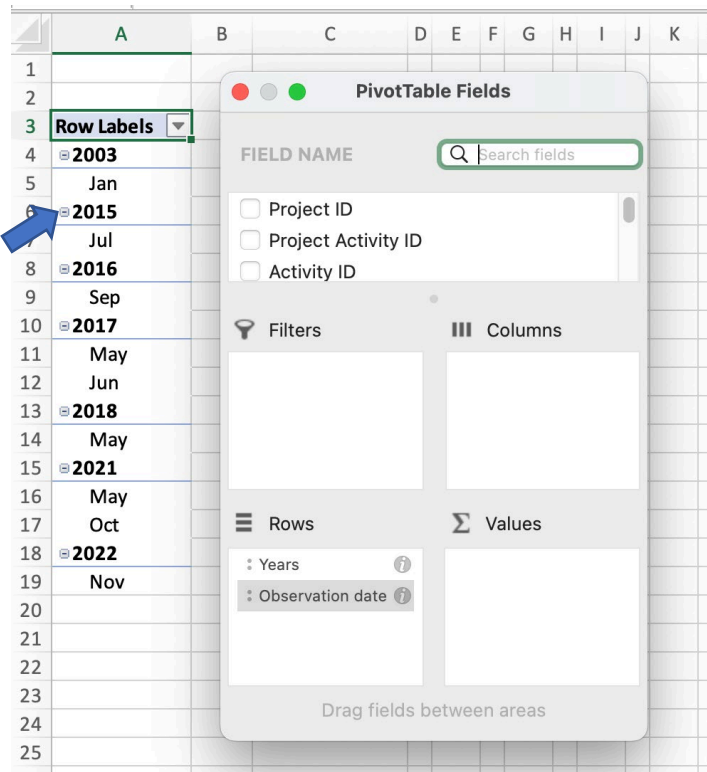
Click on group selection:



The “Grouping” Window will now appear. For this activity we want to groupings based on Months and Years so we will select these two.



Your table should now appear like this. Press the plus symbols to expand the years to show the subcategories if you need to.



Now we have our dates, we want to collect information about the **Number of Corals** surveyed during this time.

To do this:

1. Drag activity ID down into the Values section of the pivot table. It should appear as "Count of Activity ID" and your table should look like this:

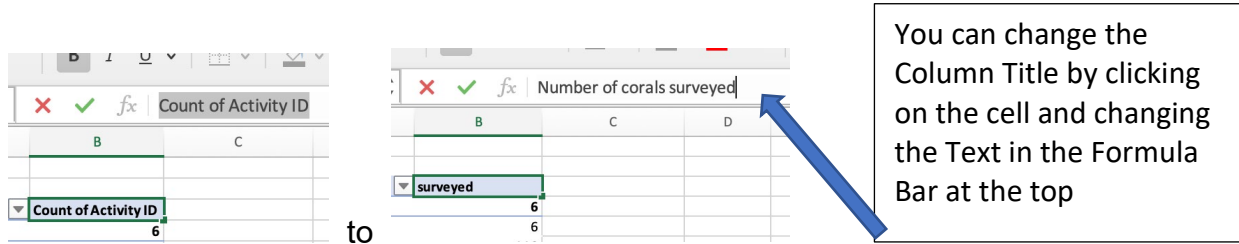
Row Labels	Count of Activity ID
2003	6
Jan	6
2015	118
Jul	118
2016	20
Sep	20
2017	168
May	102
Jun	66
2018	251
May	251
2021	207
May	155
Oct	52
2022	17
Nov	17
Grand Total	787

Remember based on the structure of our dataset, how one coral is recorded per row in excel (Refer Page 2). Therefore, if we **count** the number of rows, this will give us the number of corals. The Pivot table has a function called count that calculates this for us!

Activity ID is the unique ID given to each survey. If we count the number of times this appears per month, this will

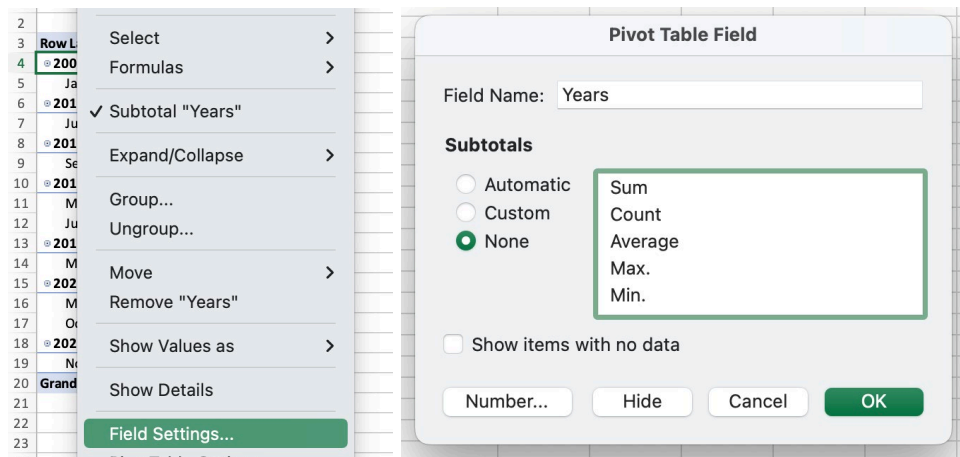
We could also use another variable like coral number. It doesn't matter if we are using the **count** function – this will give us the number of rows!

Let's give this new variable a more meaningful name. Click into the column header and change the next to "Number of corals surveyed" or "# corals surveyed".



You'll also notice the table is Automatically providing sums per year. We don't need this information, only sums per month. To change this:

Right click on the year and go to **Field settings** > Change to **None** > press OK

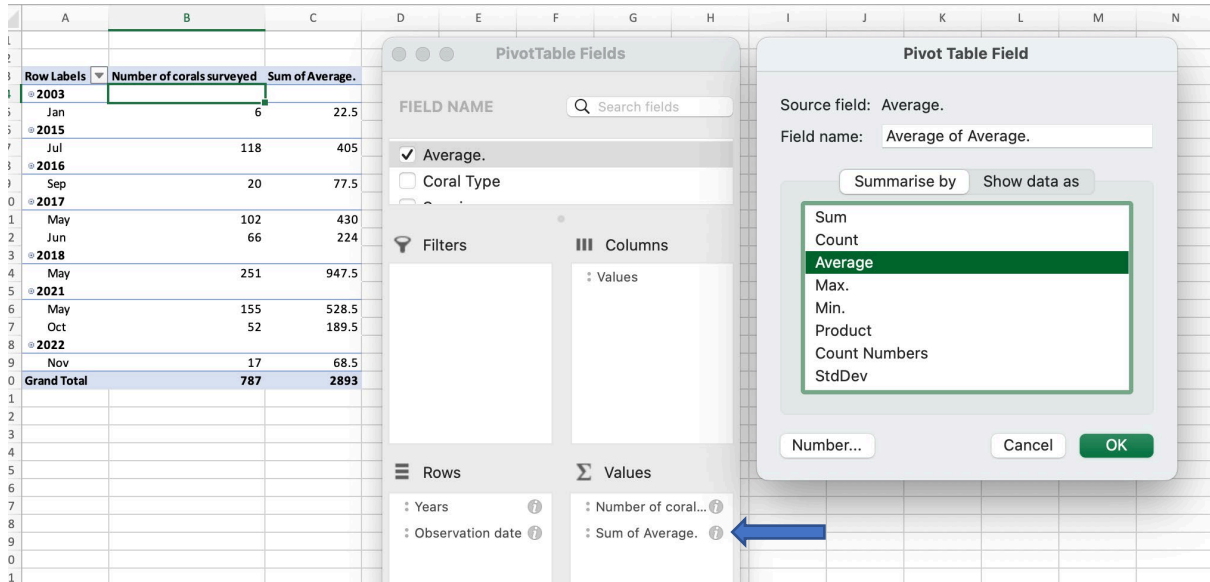


You now have a nice clean table with summaries for each month:

Row Labels	Number of corals surveyed
2023	
Jan	6
2015	118
Jul	
2016	20
Sep	
2017	102
May	
Jun	66
2018	251
May	
2021	155
Oct	52
2022	17
Nov	
Grand Total	787

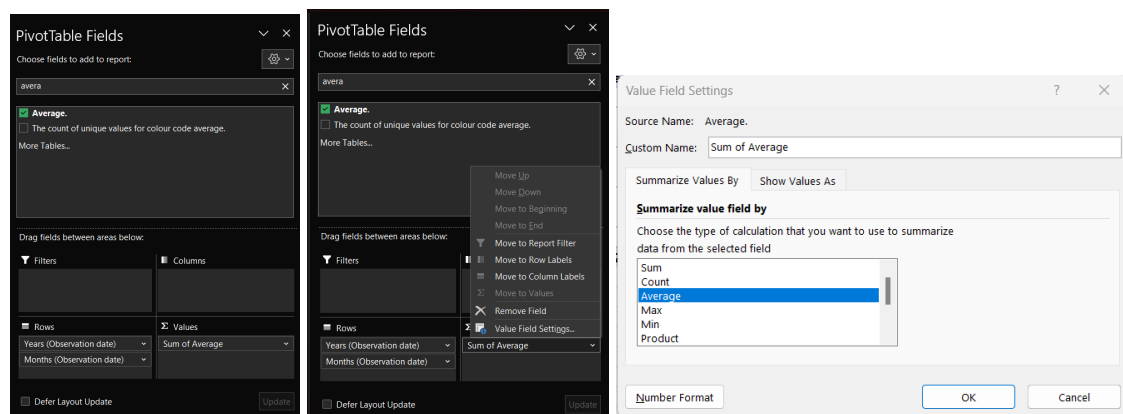
- We now we have our dates, and the number of surveys each month. Now we want to integrate information about the **average colour score**.

Drag the “**average**” field into the values category. This is initially presented as a “Sum”, so we want to change this to the **average**. Click on the “i” info button to do that.



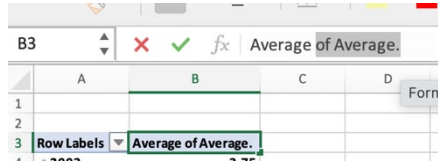
Note: For Windows instead of Mac

If you are operating on a Windows computer rather than a Mac, this is slightly different. Right click on sum of average > Go Value Field Settings > Average > OK

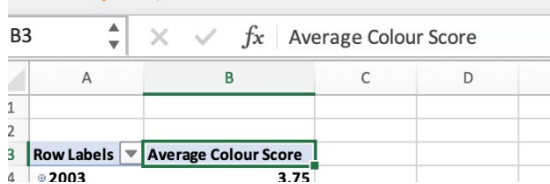


Lets do a little bit of cleaning up:

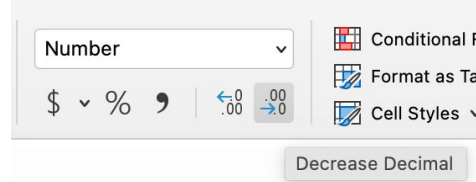
Firstly, average of average is a bit of a funny name, so we want to change this Column Title to **“Average Colour Score”**.



You can change the Column Title by clicking on the cell and changing the Text in the Formula Bar at the top



Secondly, there are also a few too many decimals. We can shorten this by using the **“Decrease Decimal”** Tool in the Home tab. You can shorten it to one or two decimal places, or whatever you prefer!



Tip: Make sure you select the data that you want to make the changes too

Number of corals surveyed	Average Colour Score
6	3.75
118	3.43220339
20	3.875
102	4.215686275
66	3.393939394

Your table should now look like this. We now have for the Date, the number of corals surveyed in that time period, and the average colour score from those surveys.

	Row Labels	Number of corals surveyed	Average Colour Score
	2003		
	Jan	6	3.75
	2015		
	Jul	118	3.43220339
	2016		
	Sep	20	3.875
	2017		
	May	102	4.215686275
	Jun	66	3.393939394
	2018		
	May	251	3.774900398
	2021		
	May	155	3.409677419
	Oct	52	3.644230769
	2022		
	Nov	17	4.029411765
	Grand Total	787	3.675984752

While it is useful to have a graph of Average Colour Score over time, it is also helpful to know the number of survey surveys used to calculate the value. A larger number of corals surveyed may give us a more accurate measure of colour score, due to the larger sample size.

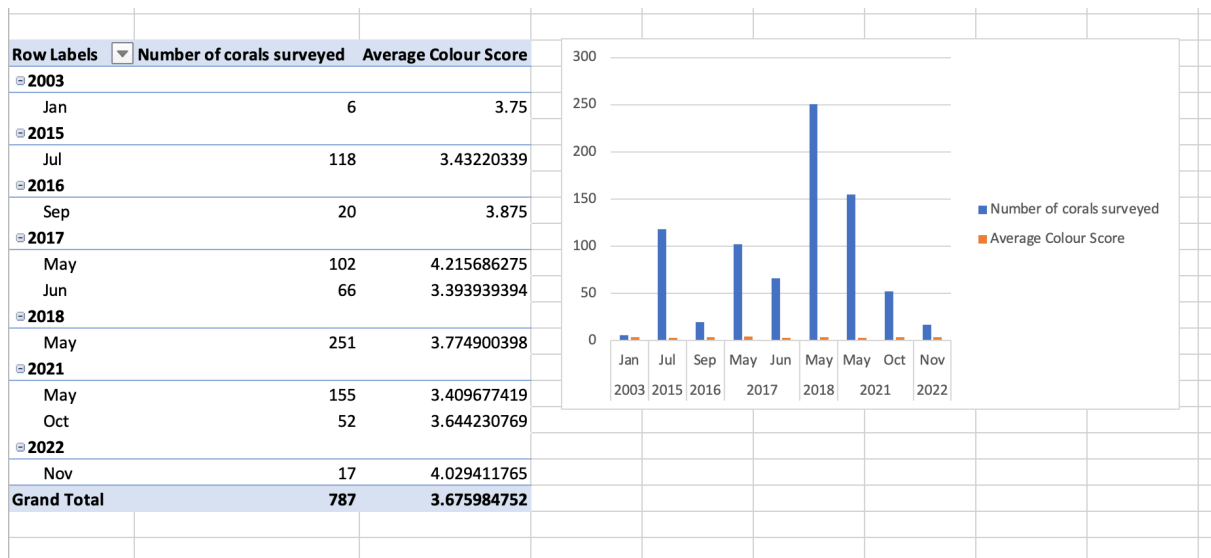
We are now ready to insert our chart!

7. Click anywhere your table. Go to **Pivot table analyse > Pivot Chart**

The screenshot shows the Excel interface with the 'PivotTable Analyze' ribbon active. The PivotTable task pane on the right is open, and a blue arrow points to the 'Pivot Chart' button. The PivotTable data is as follows:

Row Labels	Number of corals surveyed	Average Colour Score
2003		
Jan	6	3.75
2015		
Jul	118	3.43220339
2016		
Sep	20	3.875
2017		
May	102	4.215686275
Jun	66	3.393939394
2018		
May	251	3.774900398
2021		
May	155	3.409677419
Oct	52	3.644230769
2022		
Nov	17	4.029411765
Grand Total	787	3.675984752

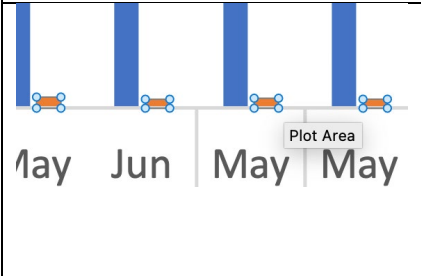
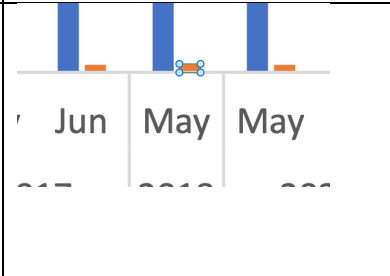
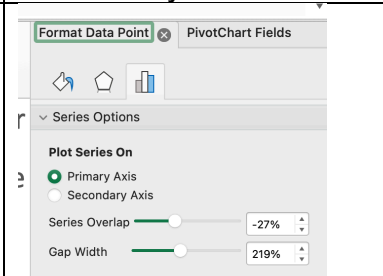
We now have a plot of the Number of Corals surveyed and the average colour score on the same graph!



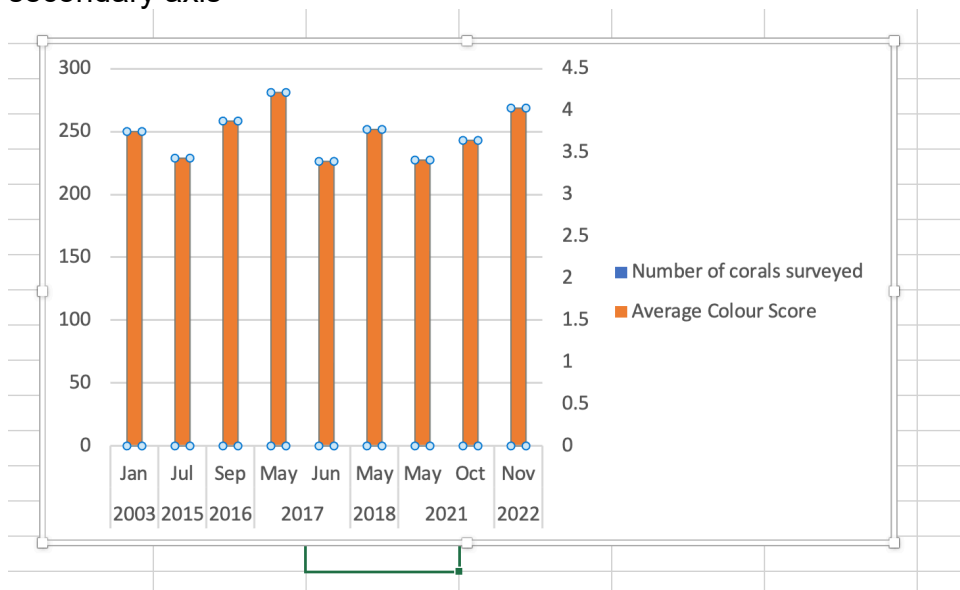
Of course, plotting these variables on the same axis has made our Average Colour Score variable look tiny as these values are small compared to the number of corals. We need to plot this on a secondary axis!

- Double click on the count of activity ID bar until the **format data point tab** comes up. Select, **Plot series on Secondary Axis**

Note: You may need to zoom in to do this as it is quite small.

Step 1: zoom in and Select	Step 2: Double click on orange	The format data tab will now pop up, click "Secondary axis"
		

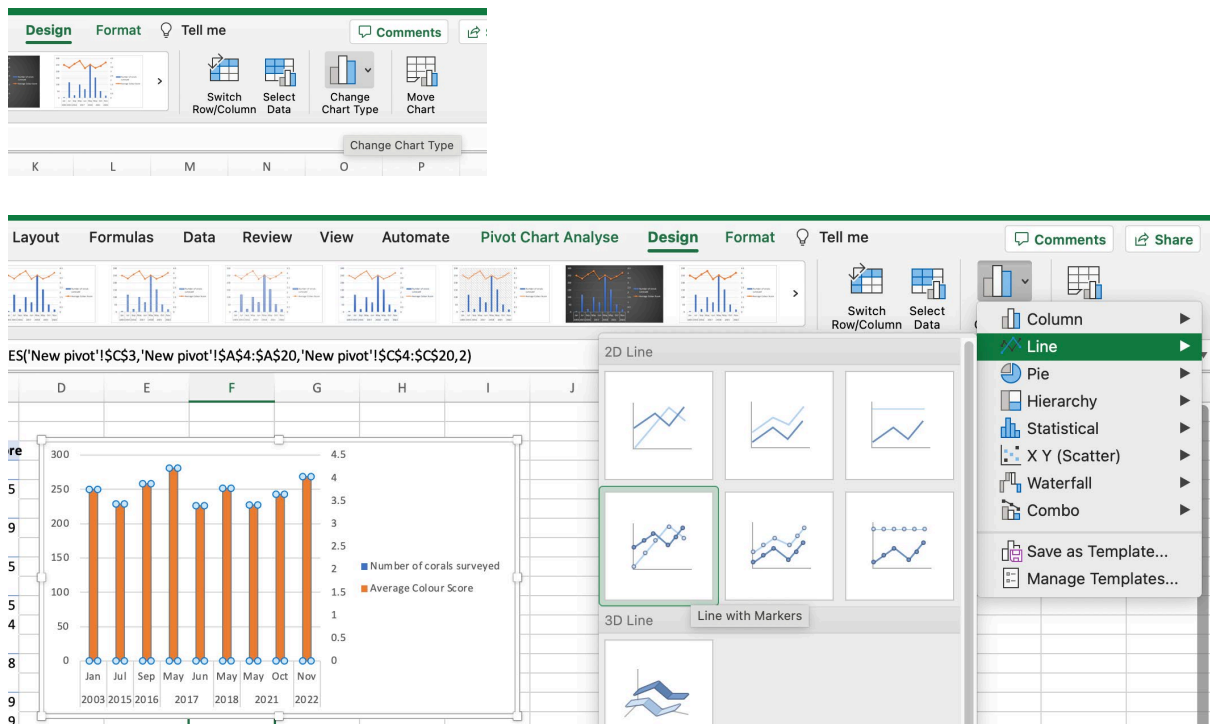
Now we have Average Colour Score appearing on the right-hand side as a secondary axis



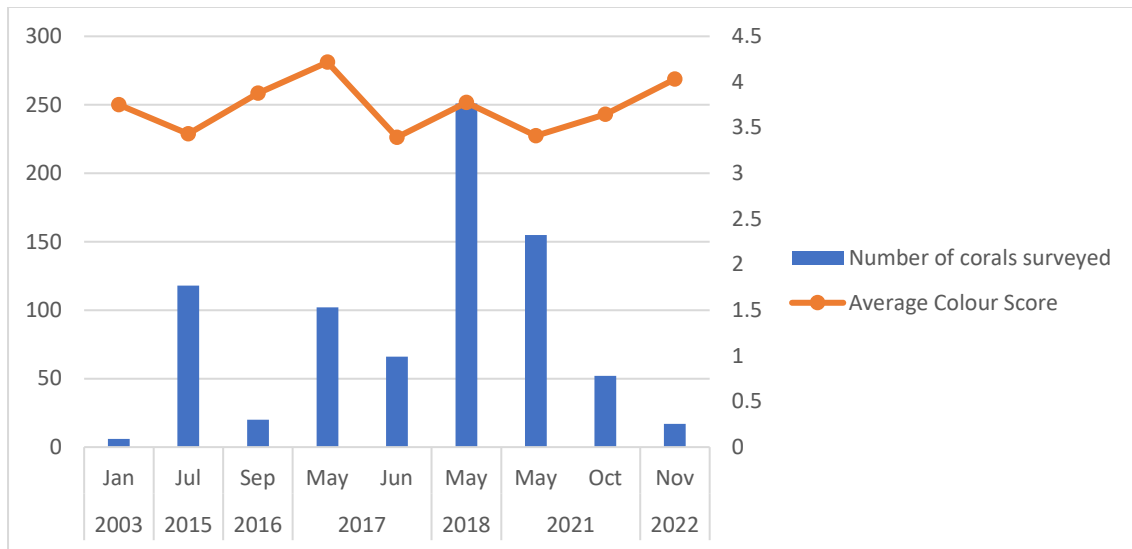
Note: As Average colour score is in front, it is blocking the number of surveys, but don't panic! We are going to change the chart type to display them both at once.

Let's change the formatting of the two variables to differentiate them a bit more. We want to change only the Colour Score Variable from a Bar Graph to a line graph.

- To do this, **Select** the “Average Colour Score” orange variable, Go to Design > Change chart type > Line > Line with Markers



Your graph should now look like this!



Now we have both variables on our graph at once in a meaningful way.

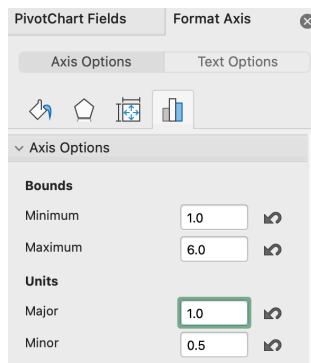
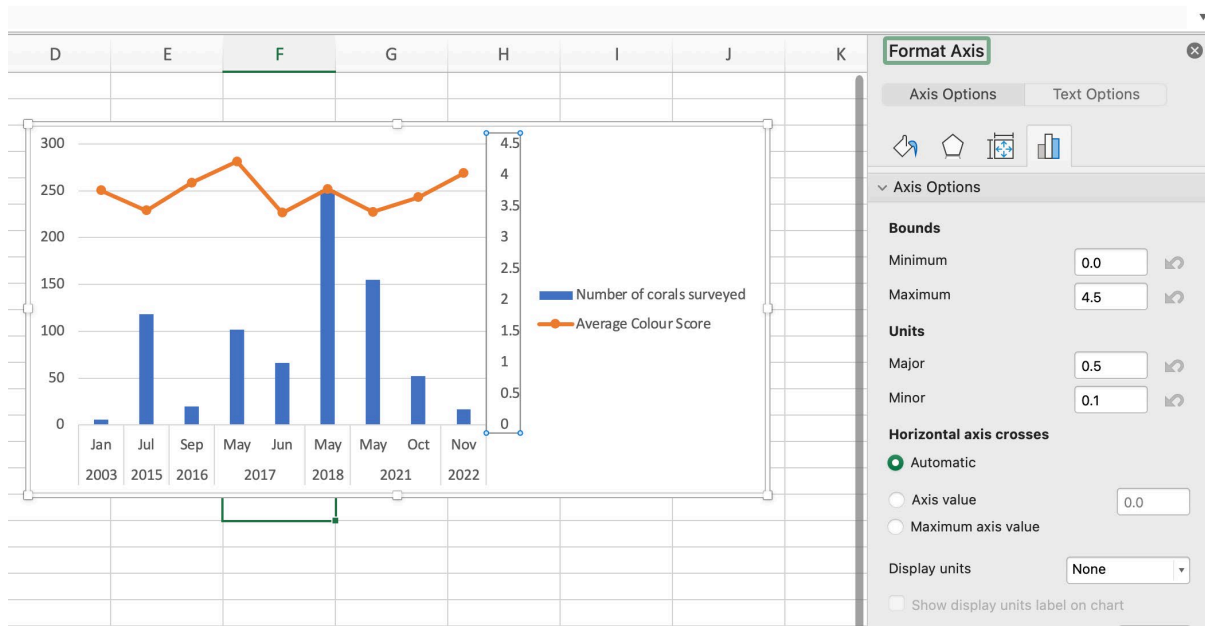
There are a final few changes we want to make to polish up our graph

- (a) Change axis range
- (b) Meaningful axis labels

Axis range: We want to make sure the axis scale matches what we use for CoralWatch.

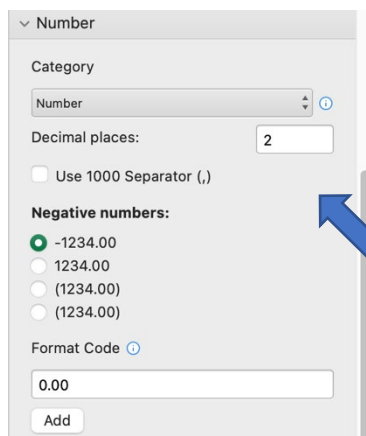
Double click on the axis and go to the “Format Axis” window on the right-hand side.

(Tip: It may be hiding behind the PivotChart Fields section”. Click on the  Section



Tip: Go to Axis Options and change the minimum to 1 and the maximum to 6.

Also, change the Major Units to 1. This will help with getting your gridlines in the right place

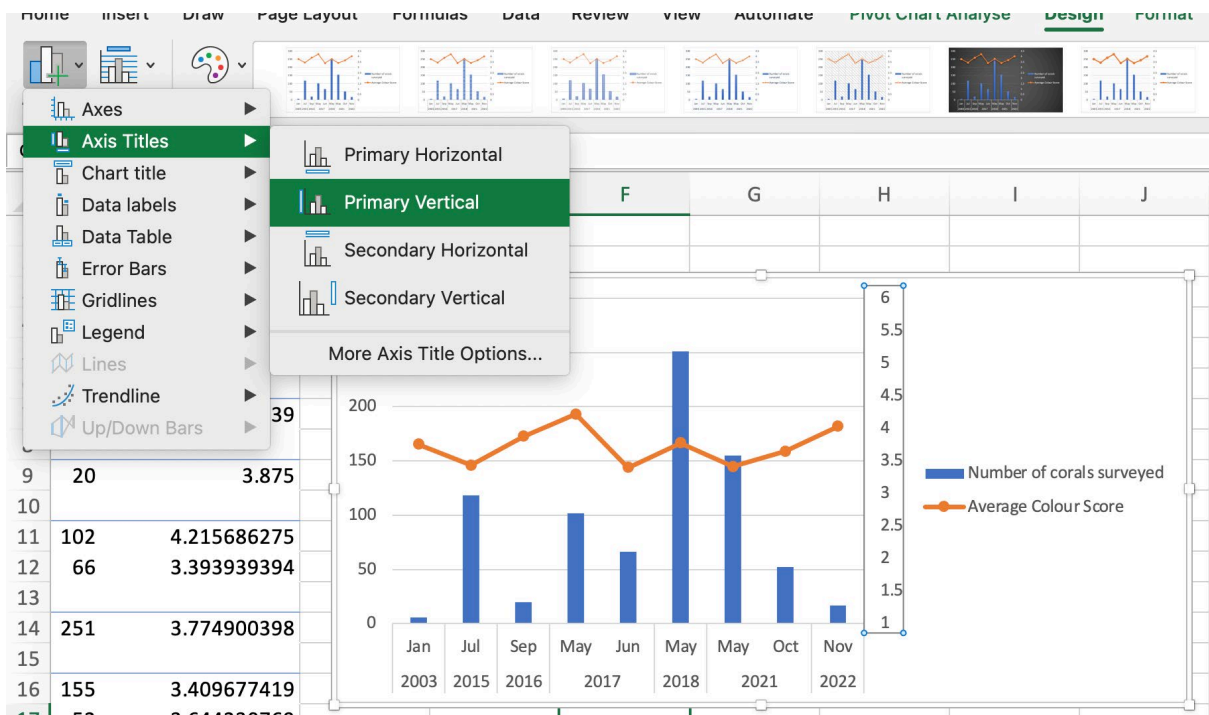
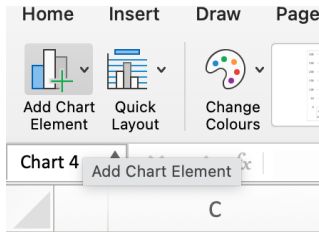


Tip: You can also remove the decimal places on the axis by scrolling down in the Format Axis Window to “Number”

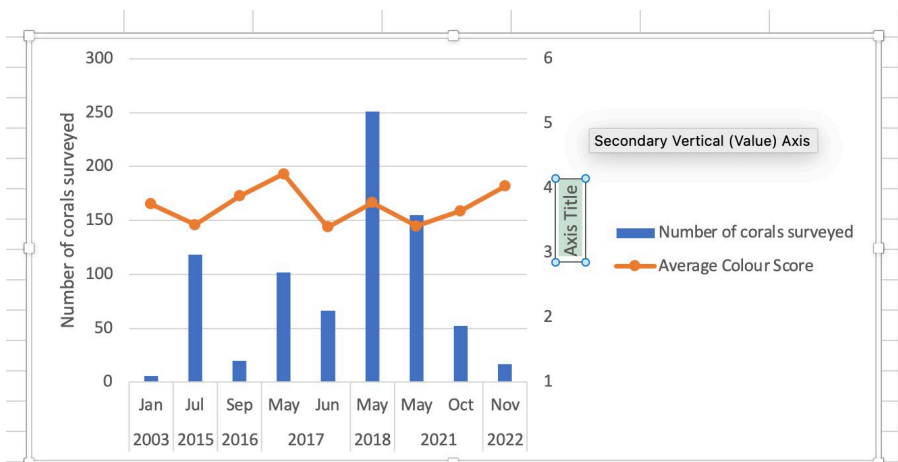
Expand this section and change the number of decimal places to 0.

Axis labels: Finally, we also want to give accurate labels for our axis so people don't mix up which side is which.

Go to Design > Add chart Element > Axis Titles and add (1) Primary Vertical and (2) Secondary Vertical

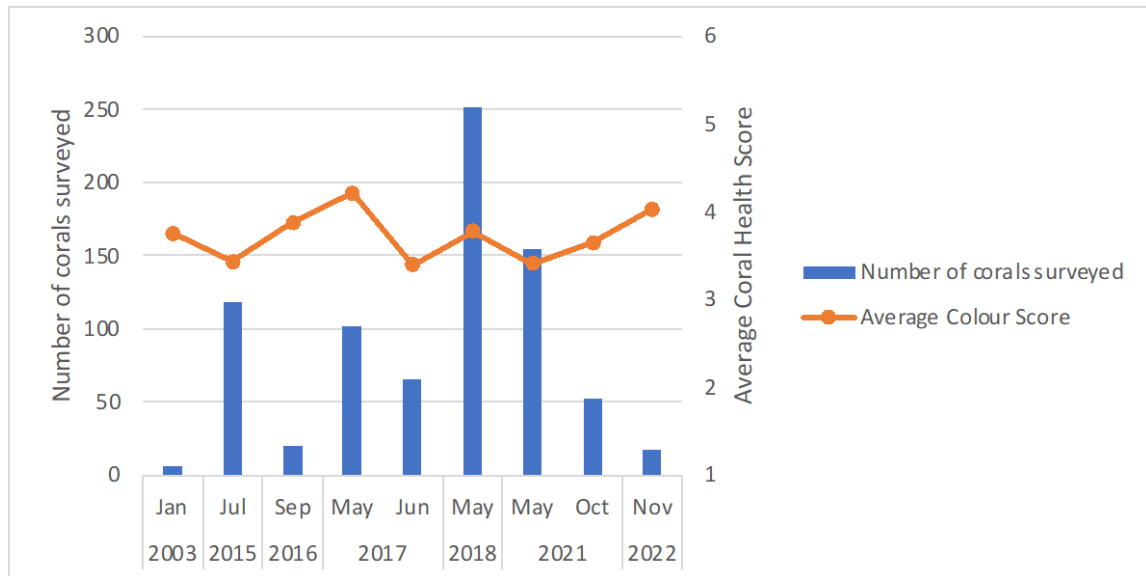


Write **“Number of Corals Surveyed”** on the left, and **“Average Colour Score”** on the right.



Congratulations! You have now created a graph for Coral Health Score over time for Heron Island Blue Pools, or an area of your choice.

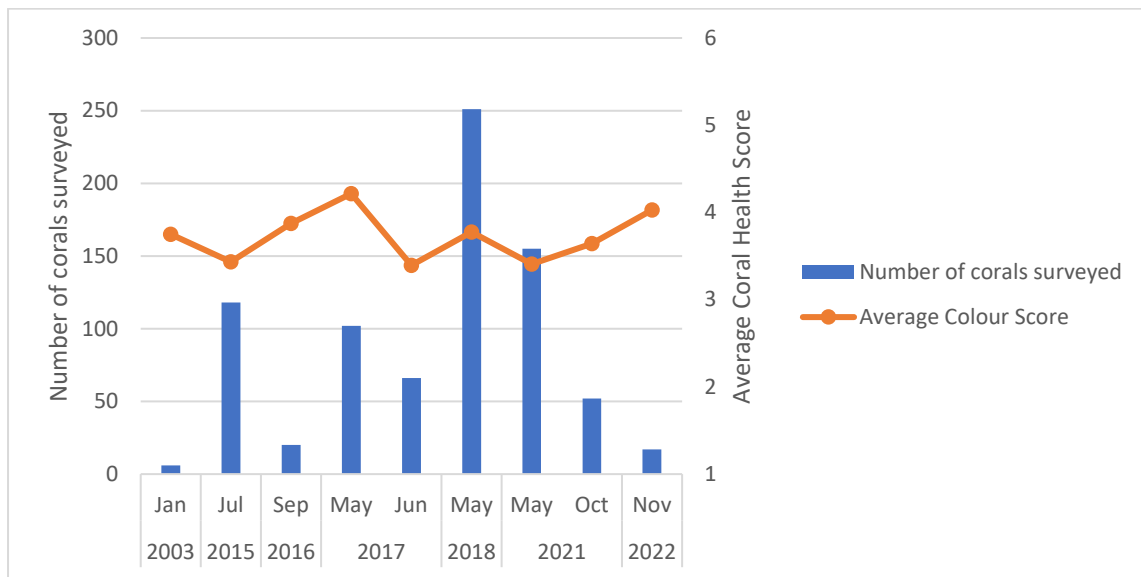
While it is useful to have a graph of Average Colour Score over time, it is also helpful to know the number of survey surveys used to calculate the value. A larger number of corals surveyed may give us a more accurate measure of colour score, due to the larger sample size. Well done.



Don't forget to give your figure an informative caption i.e.

Figure 1: Average Colour Score and number of corals surveyed from Heron Island, Blue Pools, Great Barrier Reef (QLD), Australia, between 2003-2022. This data was recorded using CoralWatch Coral Health Charts.

Extra formatting tips:



You can make the graph neater by doing the following options:

- Adding borders for each axis
- Inside tick marks for every 0.5 Coral Health Score (use minor)
- Getting grey lines to match up with Coral Health Score rather than number of surveys.
- Change font to Arial.

